

What is claimed is:

1. A shaft (12) for a rotating machine (10), characterized in that: the shaft (12) is made substantially out of only engineering plastic and includes a portion (12a-d) having one or more surfaces (12a-d) serving as respective bearing surfaces and formed from the same engineering plastic as the rest of the shaft (12), the shaft (12) thereby integrating the functions of both a shaft structure and one or more bearing structures.

2. The shaft (12) of claim 1, wherein the engineering plastic is a material including a selected polymer.

3. The shaft (12) of claim 2, wherein the selected polymer is poly-ether-ether-ketone (PEEK).

4. The shaft (12) of claim 2, wherein the selected polymer is polyimide.

5. The shaft (12) of claim 1, wherein carbon fiber is substantially uniformly distributed throughout the engineering plastic material.

6. The shaft (12) of claim 1, wherein graphite is substantially uniformly distributed throughout the engineering plastic material.

7. The shaft (12) of claim 1, wherein polytetrafluoroethylene (PTFE) is substantially uniformly distributed throughout the engineering plastic material.

8. The shaft (12) of claim 1, wherein the shaft (12) includes one or more portions (12a-b) having respective surfaces serving as respective radial bearing surfaces and one or more portions (12c-d) having respective surfaces serving as respective thrust

bearing surfaces.

9. The shaft (12) of claim 8, further characterized in that at least some of the one or more bearing surfaces (12a-d) mate with corresponding stator bearing surfaces (16a-d) of the rotating machine (10) during operation of the rotating machine (10).

10. A rotating machine (10), comprising a shaft (12) according to claim 1.

11. A rotating machine (10) as in claim 10, wherein the rotating machine (10) is adapted so that at least the bearing surface (12a-d) is lubricated or wet during operation in a wet-rotor application.

12. A rotating machine (10) as in claim 10, wherein the rotating machine (10) is a pump.

13. A rotating machine (10) as in claim 10, wherein a magnet or other structure not necessarily made from the engineering plastic is mechanically attached or bonded to the shaft (12).

14. A rotating machine (10) as in claim 10, wherein the rotating machine (10) is a wet-rotor pump.

15. A rotating machine (10) as in claim 10, wherein the rotating machine (10) is a centrifugal pump.

16. A rotating machine (10) as in claim 10, wherein the shaft is included in a rotor (11), and the rotating machine further comprises a stator (16) having one or more bearing surfaces (16a-d) corresponding to the one or more bearing surfaces (12a-d) of the shaft (12) and made of an engineering plastic.

17. A method for making a shaft (12) for a rotating machine

(10), characterized by: making the shaft (12) substantially out of only engineering plastic and including a portion (12a-d) having one or more surfaces (12a-d) serving as respective bearing surfaces and formed from the same engineering plastic as the rest of the shaft (12), thereby integrating into the shaft (12) the functions of both a shaft structure and one or more bearing structures.

18. The method of claim 17, wherein the engineering plastic is a material including a selected polymer.

19. The shaft of claim 18, wherein the selected polymer is polyether-ether-ketone (PEEK).

20. The method of claim 18, wherein the selected polymer is polyimide.